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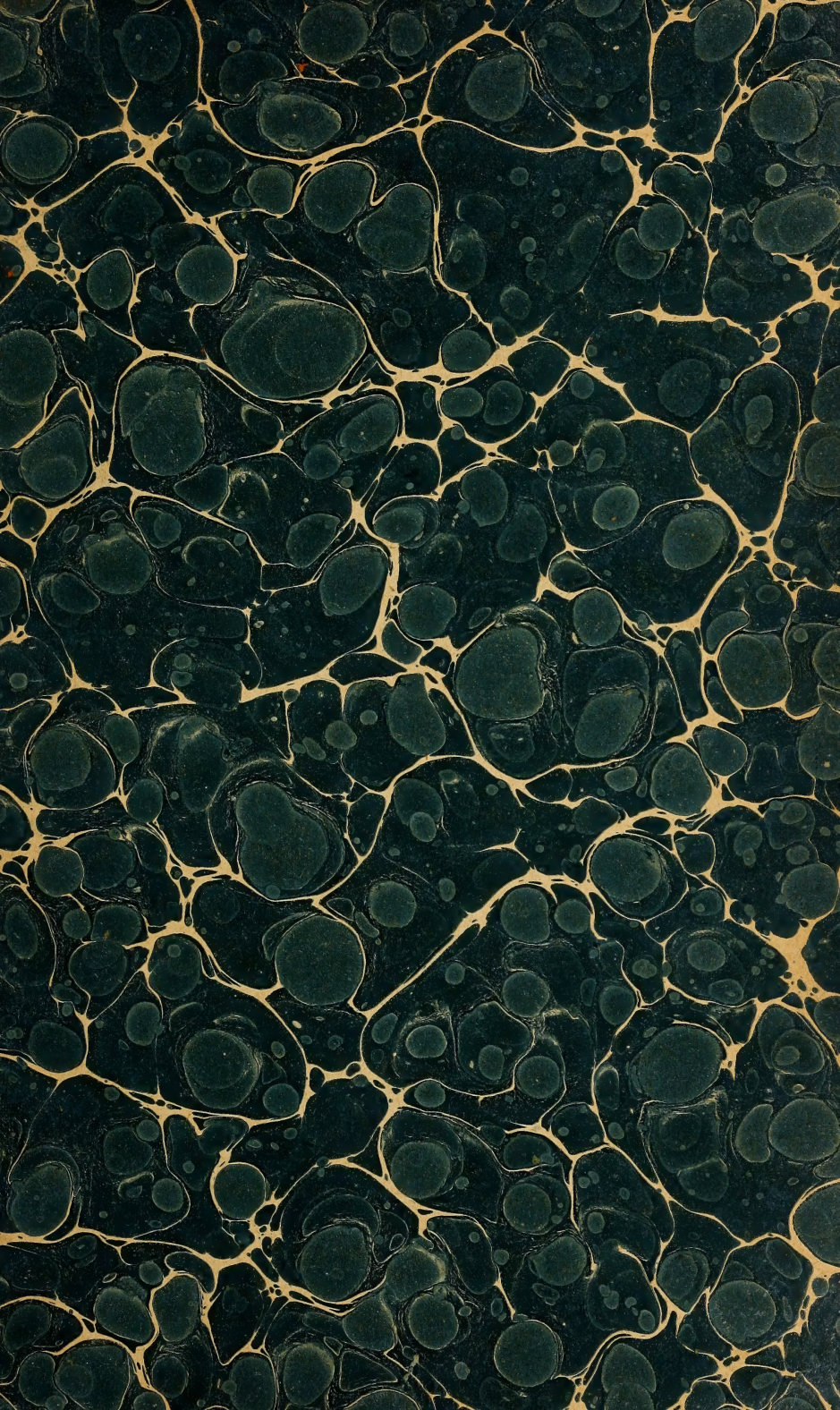

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L. O. HOWARD, Entomologist and Chief of Bureau.

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THE CATALPA SPHINX.

(*Ceratomia catalpæ* Bdv.)

By L. O. HOWARD and F. H. CHITTENDEN.

INTRODUCTORY.

Our native species of catalpa, the eastern catalpa (*Catalpa bignonioides*) and the hardy or western species (*Catalpa speciosa*), are comparatively free from insect attack. Such common shade-tree defoliators as the bagworm and fall webworm occasionally feed upon the leaves, but apparently do so only in the absence of food more palatable to them. There is one insect, however, the catalpa sphinx (*Ceratomia catalpæ* Bdv.[a]), which lives normally and exclusively on the foliage of this tree and in some seasons does very considerable injury, frequently causing complete defoliation. There is evidence that this species, owing doubtless to the increased planting of these trees in regions other than their native homes, has also increased its natural range, and injury is more extensive now than formerly. During the year 1906 injury was noticed in Ohio, New Jersey, and Pennsylvania, but in 1907 reports of damage which reached this office indicated general infestation over a much larger area. This included portions of Maryland, Virginia, the District of Columbia, Ohio, New Jersey, Indiana, and Florida. Mr. A. S. Peck, of the Forest Service, also reports injury in July, 1907, at Warsaw, Ky. It is probable that the insect also infested the intervening territory not yet reported to this Bureau.

DESCRIPTIVE.

The catalpa sphinx in its active feeding stage is a large caterpillar, attaining a length of fully 3 inches. It is very variable in color, there being a light and a dark form, as in the case of some related species. The prevailing colors are yellow and black, and this, com-

[a] Synonyms are *Sphinx catalpæ* and *Daremma catalpæ*.

bined with the large size of the insect, makes it a conspicuous object on infested trees. The complete life history by stages or periods of growth is well illustrated by the accompanying figure [a] on page 3, the drawing for which was made by the late Dr. George Marx, of whose excellent and artistic work it is one of the best published examples.

The parent of this caterpillar is a large grayish-brown moth of the family Sphingidæ, marked as shown in figure 1, *k*. It has a large heavy body and powerful wings with a total expanse of 3 inches. It deposits its eggs in masses, and in this respect differs from other sphingids. An egg mass is shown in the illustration at *a* and an individual egg at *l*. The young caterpillars are paler than the mature ones, being pale yellow and having a stout black anal horn. Two striking variations of the larva in the later stages are shown at *f* and *e*, while *h* represents the commonest dark form of caterpillar.

ORIGINAL HOME AND PRESENT DISTRIBUTION.

This insect is a strictly North American species, and its range is given by Dr. J. B. Smith [b] as from "Virginia to Florida; westward to the Mississippi; as far north as Indiana." It is an especially common form in Virginia, Maryland, and Ohio, and of late years has extended its range northward on the Atlantic coast, since it has been received at this office from several localities in southeastern Pennsylvania and New Jersey.

In 1888 it was recorded from Delaware County, Pa., and Mr. Frank M. Jones [c] states that he received it in 1893 from Sussex County, Del., while in 1894 a specimen was taken at electric light at Wilmington, Del. In 1898 the larvæ appeared on the catalpa trees at Wilmington in great numbers. The species has spread northward in Delaware, and it has greatly increased in numbers where it was formerly very rare. Its northward range seems so far to be limited by Illinois in the West, in which State Professor Forbes recorded it in 1884.[d] The range of its food plant is as follows: From the Gulf of Mexico in western Florida and on the rivers in Alabama and Georgia westward and northward along the Mississippi and its southern tributaries in the great delta formation to above the mouth of the Ohio; thence up the Wabash and White rivers of Indiana to near Vincennes.[e] This has been taken by Riley to indicate also the range of the catalpa sphinx. Published records, however, were lacking until recently to

[a] Originally published as Plate XIII, Report of U. S. Dept. Agr. for 1881–82.

[b] Monograph of the Sphingidæ of America North of Mexico, p. 205, 1888.

[c] Entomological News, November, 1898, p. 262; Feb., 1899, p. 43.

[d] Trans. Ill. State Hort. Soc., 1884, p. 125.

[e] For particulars regarding the present range, see Circ. 82, Forest Service.

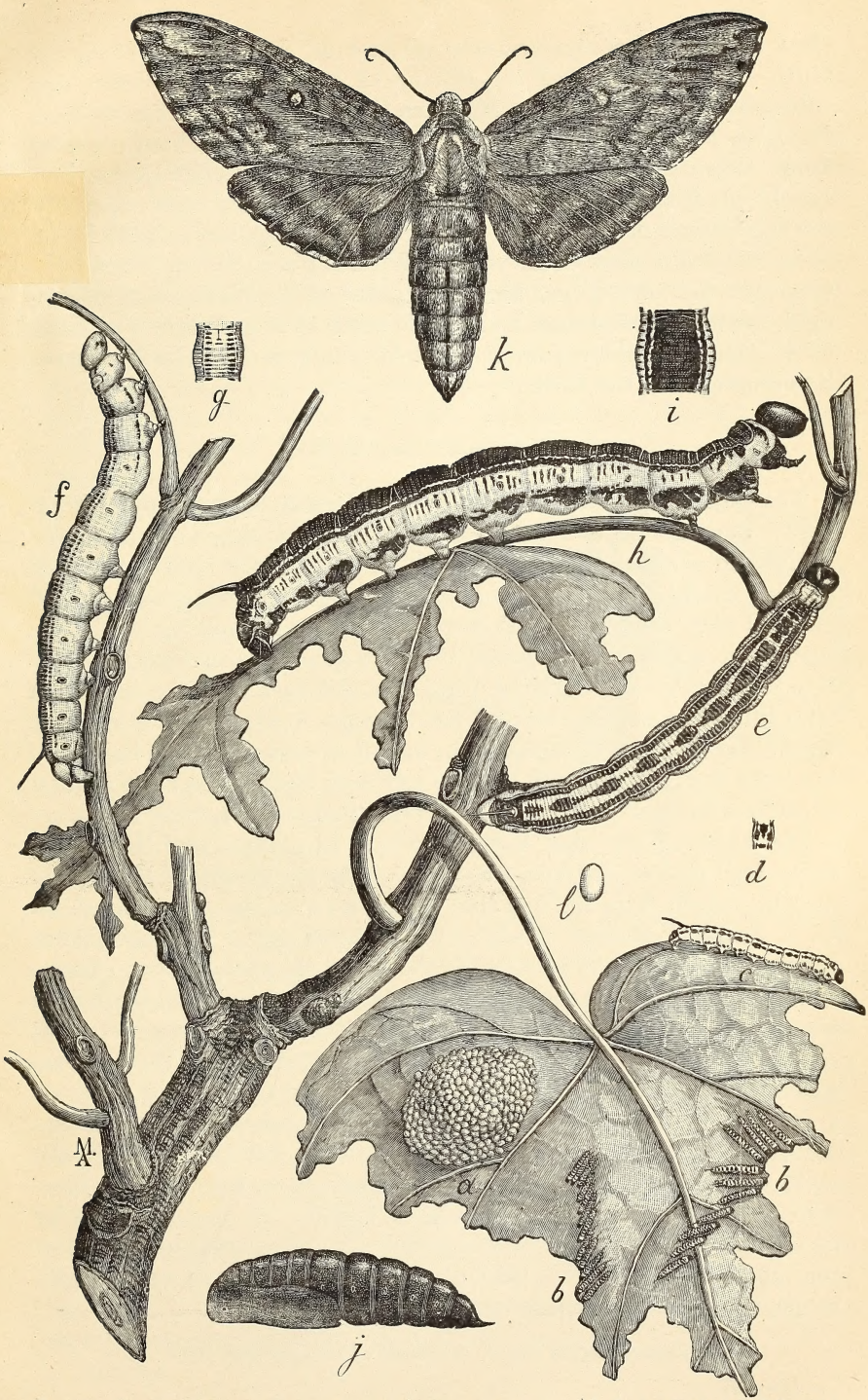

FIG. 1.—Catalpa Sphinx (*Ceratomia catalpæ*): *a*, egg mass; *b*, *b*, newly hatched larvæ; *c*, larva one-third grown; *d*, dorsal view of joint of *c*; *e*, *f*, two differently marked, nearly full-grown larvæ; *g*, dorsal view of joint of *f*; *h*, full-grown dark larva; *i*, dorsal view of joint of same; *j*, pupa; *k*, moth; *l*, egg, enlarged. All natural size, except *l* (Marx *del.*).

show its general occurrence west of Florida and Georgia along the Gulf. From the files of the Bureau of Entomology we learn that this species was observed in Alabama in 1883, and was received from Denison, Tex., in 1889. More recently the species has been reported from Arkansas (by Webster, in 1900) and from Cedar Creek, Ala. (in 1904), following which it occurred at St. Elmo, Ala. In 1899 the species was not known to occur in New Jersey, but in 1900 it was observed in Camden County, near Philadelphia, and in Hunterdon County.[a] By 1906 it had become established at Elberon and Bloomfield, the latter—westward and a little north of Manhattan, New York City—being the northernmost point of which we have knowledge of its occurrence in the East.

LIFE HISTORY AND HABITS.

The catalpa sphinx is subject to considerable fluctuations in numbers. For one or two years or even several years it will not be noticed in a given locality and will then suddenly appear in great masses, completely defoliating the trees and covering the ground beneath them with its larval excrement. It is interesting to observe that John Abbot, who collected the type specimens in Georgia, mentioned more than a hundred years ago the fact that the fishermen who inhabited the borders of the swamps hunted for these larvæ as the best bait for catching fish, and it is said that this bait is so esteemed for this purpose in some parts of Florida that the catalpa is often cultivated for no other purpose than to attract the insect.

The eggs, as has been stated, are laid in masses, and the young larvæ feed gregariously for some time. The prolificacy of the species may be judged from the fact that an egg mass in the collection of the U. S. National Museum contains nearly 1,000 eggs. The mass is not compact and is slightly fastened to the underside of the leaves. Sometimes, according to Koebele, the eggs are laid in smaller masses on the stems and branches. The larvæ molt four times, becoming as they grow older very variable in their markings. In the extreme South the insect is reported to be found in all stages during the summer, and there are three or four generations annually, the last hibernating in the pupa state beneath the ground and giving forth the moth the following March. In the summer time, according to Koebele, whose observations were made in Florida, the time occupied by an entire generation is about six weeks. In the vicinity of Washington, at Coalburg, W. Va., and probably everywhere in its northern range, there are two generations, or broods, annually.

[a] Entomological News, November, 1900, pp. 608, 611.

A number of parasitic insects attack and kill the catalpa sphinx. *Apanteles congregatus* Say, a common, widespread, and very generally parasitic enemy of sphinx caterpillars, attacks this species quite as freely as it does the "horn worms" of tobacco and tomato. Unfortunately this parasite is in turn parasitized by other Hymenoptera, of which two species, *Mesochorus aprilinus* Ashm. and *Hemiteles mesochoridis* Riley MS., are recorded. These secondary parasites in our experience, however, are not generally abundant; hence the beneficial primary parasite flourishes in spite of their attack. *Apanteles congregatus*, the primary parasite, is a minute, four-winged, wasplike fly. Its larva, a white, maggotlike creature, develops within the body of the caterpillar, and when full fed and ready for transformation each individual eats a hole through the skin of the caterpillar and spins its little white cocoon on the outside. Two hundred or more of such cocoons may be seen on the body of a single caterpillar. After a few days the winged parasite issues from the cocoons to lay eggs and produce another generation of larvæ. This parasite is abundant throughout the eastern United States.

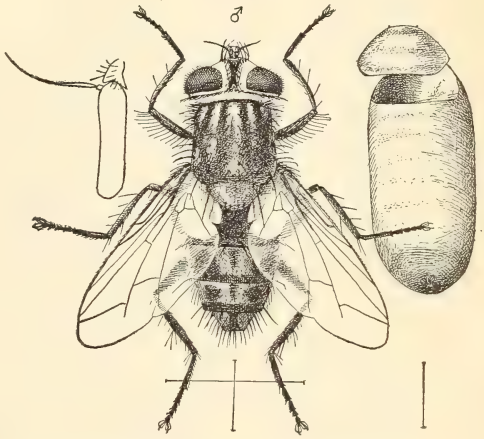

FIG. 2.—*Euphorocera claripennis*, a parasite of the catalpa sphinx: Adult with puparium at right and enlarged antenna at left. (From Howard.)

Microplitis (*Apanteles*) *catalpæ* Riley, which appears to be a special parasite of the genus Ceratomia, is also recorded as an enemy of the species under discussion. Extensive parasitism of the catalpa sphinx by this species was observed by Mr. A. F. Burgess at Jackson, Ohio, in 1905. In one case a large number of the hyperparasite *Hypopteromalus tabacum* Fitch and a few individuals of *Horismenus* (*Holcopelte*) *microgastri* Ashm. were reared from the same lot of larvæ, the hyperparasites outnumbering the primary parasites four to one. This, however, is exceptional.

Two common species of tachina flies, *Euphorocera claripennis* Macq. (fig. 2) and *Frontina frenchii* Will., also attack the larva of the catalpa sphinx. These are general parasites of Lepidoptera, the former infesting 27 distinct species, the latter 22.

A few birds prey upon the caterpillar, but most of them evidently find it, when full grown, a rather tough morsel, the skin being especially tough and thick and the insect a very muscular one, so that, in fact, it is difficult to crush one with the end of a cane. Among the birds which have been recorded as destroying this insect are cuckoos, the catbird, and the Baltimore oriole.

REMEDIES.

The catalpa sphinx may be readily destroyed by different methods.

Hand picking.—Owing to its large size, the caterpillar is easily seen, and it is possible to control it by hand picking with the aid of a long ladder and a 12-foot pole pruner or similar device.

Arsenicals.—The insect can be destroyed by an arsenical spray of either Paris green or arsenate of lead, applied as for other shade-tree pests, such as the tussock moth and fall webworm.[a] We may take advantage of our knowledge of the gregarious habit of the young of this caterpillar by watching rather closely for it in the spring, and if the leaves are observed to be eaten in any particular place, a poisonous spray should be applied. This may frequently save an entire tree. Where only a few trees are to be treated, it will be best to spray all the leaves. Owing to the fact that the foliage is frequently infected by a leaf-spot disease,[b] the added precaution of using Bordeaux mixture as a diluent for either the Paris green or arsenate of lead is advisable.

Destruction of the pupæ.—Where the caterpillars have been so abundant as to have affected the trees, it will pay as a precaution for the following year to spade up the ground thoroughly and disintegrate it in the fall so as to destroy the pupæ, which will be found concentrated under the surface of the ground in the immediate vicinity of the trunk.

Protecting the parasites.—The second or last generation, which appears in September and October, is largely destroyed by parasites which are frequently very abundant just as the oldest caterpillars are beginning to reach full growth. At this time the parasites, which have been previously mentioned, issue from the body of their host and spin large masses of white cocoons on the backs of the caterpillars. These masses are so large that they can be seen at a considerable distance against the black stripes of the host insect. It is not advisable to destroy the caterpillars at this stage, as the parasites are very beneficial and in ordinary seasons will reduce the numbers

[a] For directions, see Farmers' Bulletins 99 and 127, which may be obtained gratis upon application.

[b] *Phyllosticta catalpæ.*

of the sphinx caterpillars so that they will not appear the following season to do much harm. Where the caterpillars can be easily gathered, it will pay to pick them from the leaves and transfer them to barrels or large boxes covered with wire netting. This will prevent the caterpillars from issuing or falling a prey to birds or other animals, and will insure the issuance of the parasites through the meshes, thus encouraging their good work. A few holes should be bored in the bottom of the barrels or boxes used, small enough to prevent the caterpillars from crawling through them into the ground. This will prevent the accumulation of water after rains which might drown the insects or set up putrefaction in the mass.

If the cooperation of neighbors who have catalpa trees growing on their premises can be secured, this caterpillar can be largely controlled for several years in succession.

Approved:

JAMES WILSON,
Secretary of Agriculture.

WASHINGTON, D. C., *November 6, 1907.*

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